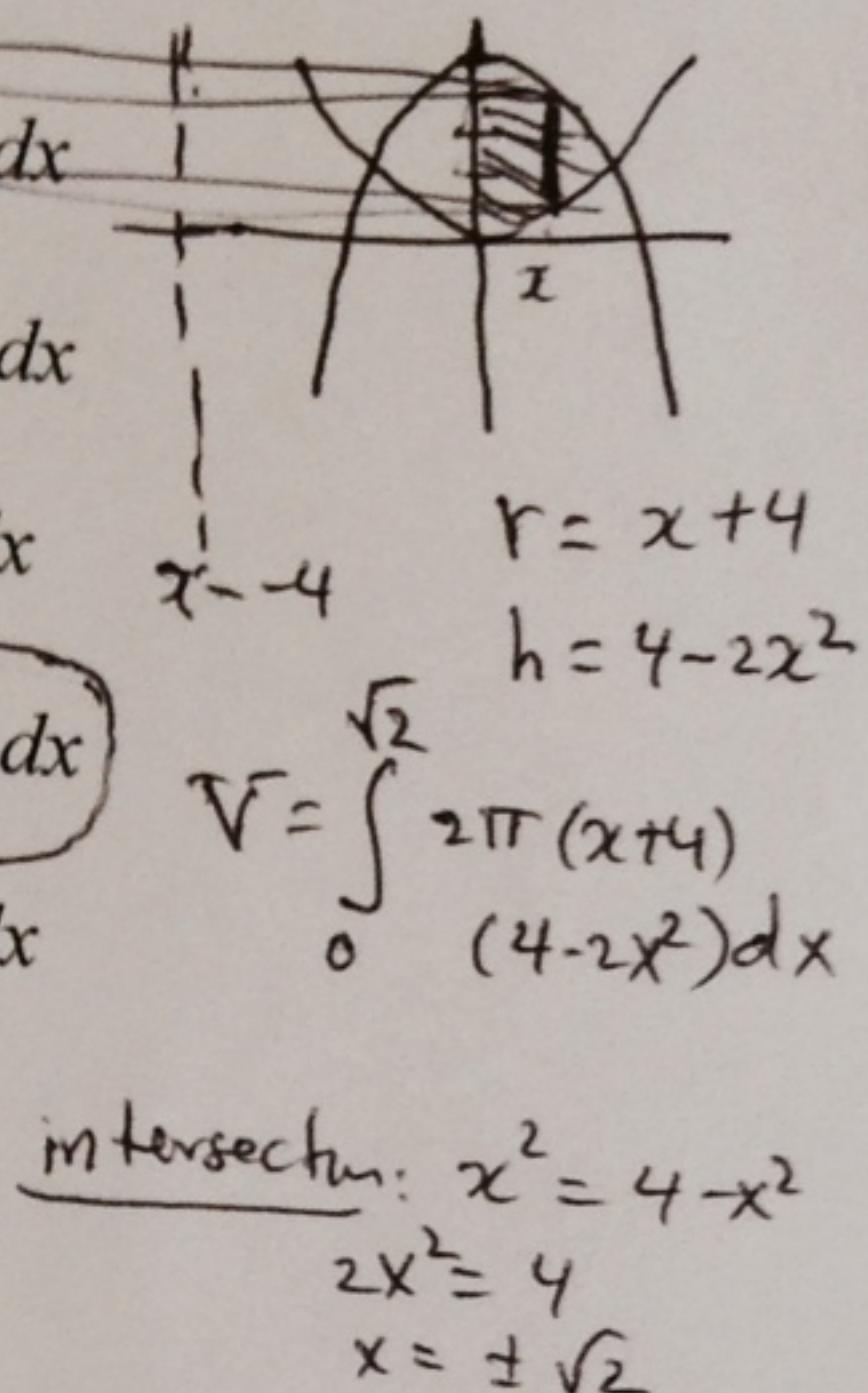


(circle one letter only)

1) The region in the first quadrant enclosed by the parabolas $y = x^2$, $y = 4 - x^2$, and the y-axis is rotating about the line $x = -4$, then the volume of the solid is given by

- (a) $\int_0^{\sqrt{2}} 2\pi(4+x)(3-2x^2)dx$
- (b) $\int_0^{\sqrt{2}} 2\pi(4+x)(4+2x^3)dx$
- (c) $\int_0^2 2\pi(4-x)(4-2x^2)dx$
- (d) $\int_0^{\sqrt{2}} 2\pi(4+x)(4-2x^2)dx$**
- (e) $\int_0^2 2\pi(4+x)(4-2x^2)dx$
- (f) None of the above



Intersection: $x^2 = 4 - x^2$
 $2x^2 = 4$
 $x = \pm \sqrt{2}$

2) $\int_{-1}^0 14r^4(1-r^5)^6 dr = I$ $u = 1 - r^5$
where $c = 2^7$ $du = -5r^4 dr$

(a) $2c/5 - 2/5$

(b) $-c/10 - 2/5$

(c) $c/2 - 2/5$

(d) $c/7 - 2/5$

(e) $-c/7 - 2/5$

(f) None of the above

$$I = \frac{14}{5} \int (-5r^4)(1-r^5)^6 dr$$

$$= -\frac{14}{5} \int u^6 du = \frac{14}{5} \int u^6 du$$

$$= \frac{14}{5} \left[\frac{1}{7} u^7 \right]_1^2$$

$$= \frac{2}{5} [4^7]_1^2 = \frac{2}{5} [2^7 - 1]$$

$$= 2 \cdot 2^7 / 5 - 2/5$$

$$= 2c/5 - 2/5$$

3) $\int_{-\pi/6}^{\pi/2} \sin|2x|dr = \int_{-\pi/6}^0 + \int_0^{\pi/2}$

(a) $\sqrt{3}/4$

(b) $3/4$

(c) $5/4$

(d) $1+1/\sqrt{2}$

(e) $1-\sqrt{3}/4$

(f) None of the above

$$= -\int_{-\pi/6}^0 \sin(2x) + \int_0^{\pi/2} \sin(2x)$$

$$= \frac{1}{2} \cos(2x) \Big|_0^{-\pi/6} - \frac{1}{2} \cos(2x) \Big|_0^{\pi/2}$$

$$= \frac{1}{2} \left[1 - \frac{\sqrt{3}}{2} \right] - \frac{1}{2} [-1 - 1]$$
~~$$= \frac{1}{2} \left[1 - \frac{\sqrt{3}}{2} \right] + 1 = \frac{5}{4}$$~~

4) The slope of the tangent line to the curve

$$y = \int_2^{\sec x} \frac{\sqrt{t^2-1}}{t} dt, \quad 0 < x < \pi/2$$

at $x = \pi/3$

(a) $1/2$

(b) 3

(c) 2

(d) $2\sqrt{3}$

(e) $\sqrt{3}/4$

(f) None of the above

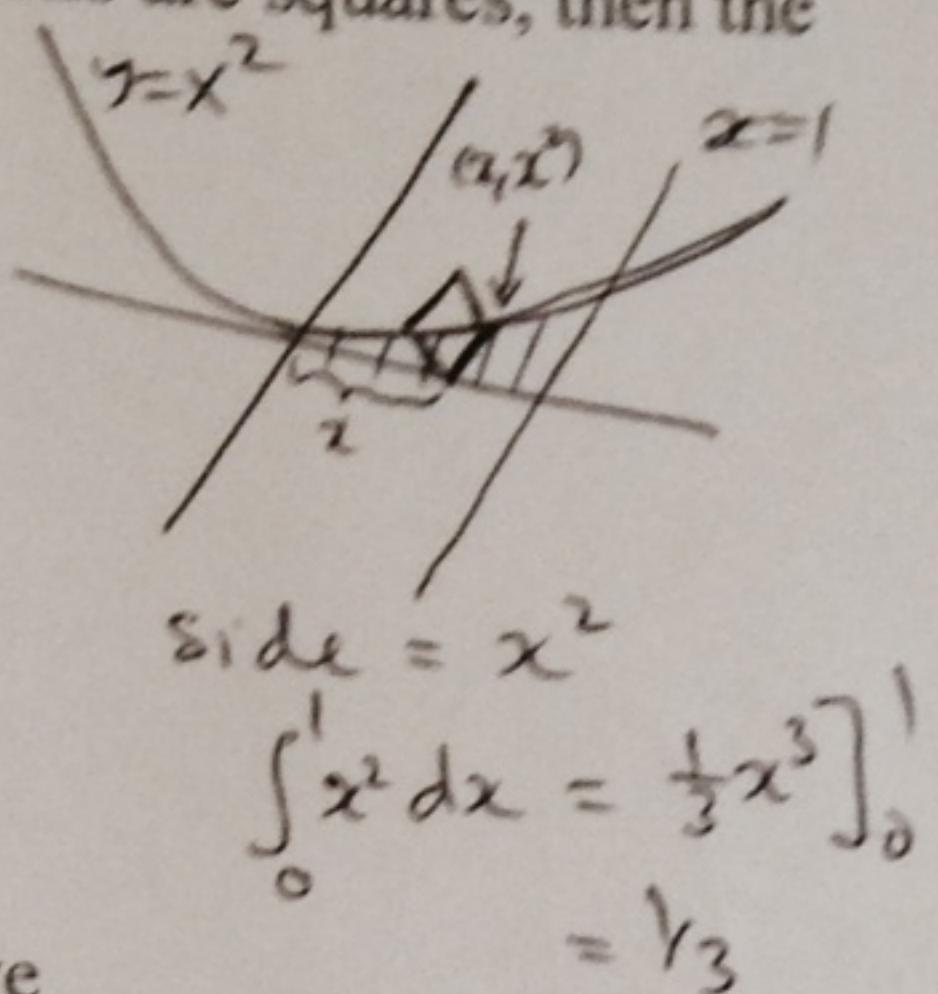
$$y' = \frac{\sqrt{\sec^2 x - 1}}{\sec x} (\sec x \tan x)$$

$$y'\left(\frac{\pi}{3}\right) = \frac{\sqrt{(2)^2 - 1}}{2} \left(\frac{1}{2}\right)(\sqrt{3})$$

$$= \frac{\sqrt{3}}{2}(2)(\sqrt{3}) = 3$$

5) The base of a solid is bounded by the curves $y = x^2$, $y = 0$ and $x = 1$. If the cross-sections perpendicular to the x -axis are squares, then the volume of the solid is

- (a) 1
- (b) $1/2$
- (c) $1/5$
- (d) $1/3$**
- (e) $1/4$
- (f) None of the above



6) The volume of the solid generated by rotating the region enclosed by the curve $y = 2\sqrt{x}$ and the lines $y = 2$ and $x = 0$ about the x -axis, is equal to

- (a) 1
- (b) 0
- (c) 4π
- (d) 3π
- (e) 2π**
- (f) None of the above

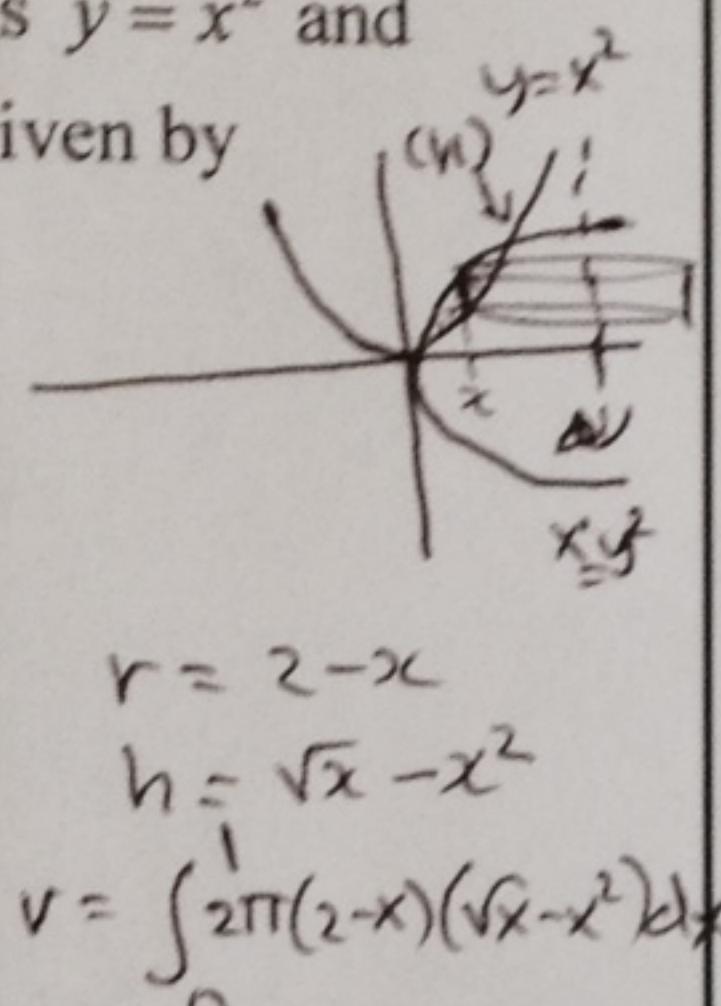
$$V = \int_0^4 2\pi y^3/4 dy$$

$$= \frac{\pi}{2} \int_0^4 y^3 dy = \frac{\pi}{2} \left[\frac{y^4}{4} \right]_0^4$$

$$= \frac{\pi}{8} [16 - 0] = 2\pi$$

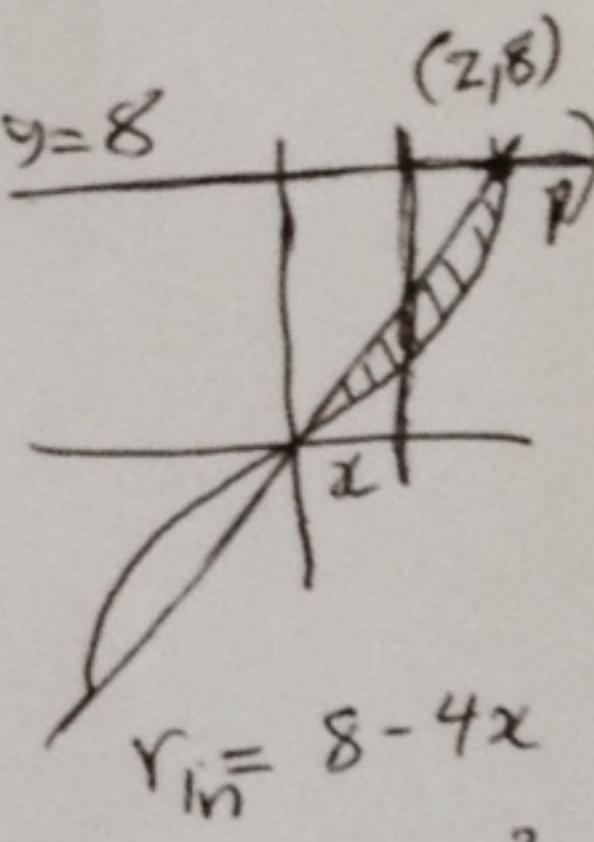
7) The volume of the solid generated by rotating the region bounded by the curves $y = x^2$ and $x = y^2$ about the line $x = 2$ is given by

- (a) $\int_0^1 \pi(2-x)(\sqrt{x}-4x^2)dx$
- (b) $\int_0^2 2\pi(2-x)(\sqrt{x}-x^2)dx$
- (c) $\int_0^1 2\pi(2-x)(\sqrt{x}-2x^2)dx$
- (d) $\int_0^1 2\pi(4-x)(\sqrt{x}-x^2)dx$
- (e) $\int_0^1 2\pi(2-x)(\sqrt{x}-x^2)dx$**
- (f) None of the above



8) The region bounded by the curves $y = x^3$ and the line $y = 4x$ in the first quadrant is revolved about the line $y = 8$. The volume of the solid generated is given by

- (a) $\int_0^2 \pi(x^6 - 16x^3 - 16x^2 + 64x)dx$
- (b) $\int_0^2 \pi(x^6 + 16x^3 + 16x^2 + 64x)dx$
- (c) $\int_0^1 \pi(x^6 - 16x^3 - 16x^2 + 64x)dx$
- (d) $\int_0^2 \pi(16x^3 - 16x^2 + 64x)dx$
- (e) $\int_0^2 \pi(x^6 - 16x^3 - 16x^2)dx$
- (f) None of the above



$$\int_0^2 \pi((8-x^3)^2 - (8-4x)^2)dx$$

$$9) \int \frac{1+\sec^2 x \tan x}{\sec x} dx = \int \left(\frac{1}{\sec x} + \sec x \tan x \right) dx$$

$$= \int (\cos x + \sec x \tan x) dx$$

- (a) $\ln|\sec x| + C$
- (b) $\sin x + \frac{1}{3}\sec^3 x + C$
- (c) $\sin x + \cos x + C$
- (d) $\tan x + \cos x + C$
- (e) $\sin x + \sec x + C$**
- (f) None of the above

$$10) \int_{-\pi}^{\pi} \frac{t^2 \cot t}{4 + \sec t} dt = \text{Let } f(t) = \frac{t^2 \cot t}{4 + \sec t}$$

$$f(-t) = \frac{(-t)^2 \cot(-t)}{4 + \sec(-t)}$$

$$= -\frac{t^2 \cot t}{4 + \sec t} = -f(t)$$

Hence, $f(t)$ is odd

$$\int_{-\pi}^{\pi} f(t) dt = 0$$

- (a) $-1/2$
- (b) $1/2$
- (c) $-1/4$
- (d) $1/4$
- (e) 0**
- (f) None of the above